Cryptocurrency as a (Committed) Alternative Currency

Chris Ackerman

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Motivation—What am I trying to model?

- I want a disciplined way to think about what the "rise of cryptocurrency" *could* mean for government currencies.
- The feature of cryptocurrencies that I find most interesting is smart contracts; i.e. can credibly commit to follow a specific policy.
- Would like to see how this imposes some restrictions on what government monetary policy can do
  - Normally government currencies are "credible", but here their key feature is "flexibility"—they can react to unforeseen circumstances but don't have the same strength of commitment power

Motivation—What do *I* want to learn from this project?

- What's the simplest model I can write down to deliver the result(s) that I want?

- What do "clean results" and a legible model look like?

- What do I have to do to make my basic model more realistic, and what is the trade-off?

Model Ingredients

Players:

- Monetary authority
  - Perfect flexibility
  - Imperfectly aligned incentives
- Cryptocurrency
  - No flexibility/perfect commitment
  - Can choose optimal (in expectation) policy for consumers

Consumers:

- Have an optimal monetary demand/quantity
- Some penalty function for missing the optimal policy
- Choose between the monetary authority and cryptocurrency
- Needs to have some sort of shock so that the cryptocurrency can't hit the optimal demand each period

Monetary Authority

- Perfectly flexible; can set any quantity or policy it wants each period
- Needs some sort of friction/wedge to give the consumers a reason to choose
- Government has some incentive to follow some other rule

$$y_t = \begin{cases} y_t^{opt} & \text{with prob } p \\ y_t^{alt} & \text{with prob } 1-p \end{cases}$$

- Restriction is on how small p can be
- Need to specify some y^{alt} (probably just $y^{alt} > y^{opt}$ to inflate away some debt), but anything more complicated I would want to read macro papers for

Cryptocurrency

- Can set any deterministic rule that it wants, but cannot change in response to shocks
- The feature I really want to capture is *perfect commitment*

$$y_t = (1 + i)y_{t-1}$$

- Easiest approach seems to be to set this rule exactly the same as the consumer's optimal policy, without the exogenous shock—then only the shocks are creating wedges, not sub-optimal cryptocurrency rules
- Could also do a more complicated rule from macro literature if that would be interesting

Consumers

- A government that chooses to enact different policy with some probability requires consumers with beliefs about the true p and shocks to consumer demand for currency
  - Bayesian updating for consumer beliefs about p

$$y_t = (1+i)y_{t-1} + \varepsilon$$

- I would like to avoid any explicit model of demand for currency; rather focus on the size/distribution of shocks

Results

- Should be a restriction on possible pairs of $\{p, \varepsilon\}$
  - If there are big exogenous shocks to the optimal money supply, then the government's flexibility is more valuable, and they can abuse the consumers by more without losing market share.

- What do "clean results" look like, and what would be a satisfying conclusion?
  - When is it appropriate to start imposing distributional assumptions for ε?

Possible Directions

- I would like to add heterogeneous agents
- Goal is to get some agents to switch to the cryptocurrency earlier
- Ideally could calibrate this switching to market share(s) of cryptocurrency to match the “rise” of fully committed alternative currencies

Some other options:

- Portfolio problem; let agents hold both currencies
- Debt stock and dynamic problem for the government
- Some attempt to capture commitment power of the government